

skill in the art would know what is meant by “substantially equal.” *Andrew Corp. v. Gabriel Electronics*, 847 F.2d 819, 6 USPQ2d 2010 (Fed. Cir. 1988). Therefore, Applicant respectfully submits that all pending claims are in full compliance with 35 U.S.C. § 112 and requests withdrawal of the rejection of claims 1-15 under § 112, second paragraph.

Claim Rejection – 35 USC § 102

Claims 1, 2, 4, 5, and 7-10 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Naulleau *et al.* (US Pat. No.6,233,056). Applicant respectfully traverses this rejection for at least the following reason.

The Office Action contends that Naulleau *et al.* teaches a lithographic projection exposure apparatus and a corresponding method comprising all basic structures recited in the instant claims. In particular, the Office Action contends that Naulleau *et al.* teaches a substrate stage for holding a substrate (50, 54), an interferometer measurement system (48) for measuring wave front aberrations of the projection system and comprising a grating in a grating plane (38) which is movable into and out of the projection beam such that the grating plane is “substantially coincident” with the object plane and a pinhole arranged in a pinhole plate (46) which is movable into and out of the projection beam such that the pinhole plane is substantially coincident with a plane optically conjugate to the object plane. Applicant respectfully disagrees.

Naulleau *et al.* teaches a method for implementing a phase shifting point diffraction interferometer (PSPDI) to determine flare in an optical system, where flare is a halo of light surrounding the optical system point-spread function that is caused by scatter within the optical system. Therefore, Naulleau *et al.* is not directed to a lithographic projection apparatus. Specifically, Naulleau *et al.* does not disclose teach or suggest, *inter-alia*, a substrate table to hold a substrate and Naulleau *et al.* does not disclose, teach or suggest a support structure to support a patterning structure, the patterning structure serving to pattern the projection beam according to a desired pattern. Contrary to the Office Action contention, the item 54 in Naulleau *et al.* refers to a mask stage and is not a substrate stage. Furthermore, in Naulleau *et al.*, the mask 34 merely serves to generate a spherical wave front using the pinhole 36 formed in the mask 34. Thus Naulleau *et al.* mask 34 does not have a patterning structure serving to pattern the projection beam. Furthermore, contrary to the Office Action contention, Naulleau *et al.* grating 38 is not movable into and out of the projection beam such that the grating plane is substantially coincident with the object plane, as recited in claim 1.

The grating 38 in Naulleau *et al.* is merely movable with motors for alignment purposes (see, col. 7, lines 40-43 in Naulleau *et al.*) and must be located downstream from the pinhole 36. Indeed, the grating 38 in Naulleau *et al.* must be spaced apart from the pinhole 36 in order to diffract the beam 35, i.e. to split the illumination beam 35 to create the required test and reference-beams 40 and 42 (see, col. 7, lines 21-24). Moreover, Naulleau *et al.* does not disclose teach or suggest that the pinhole plate 46 is movable into and out of the projection beam such that the pinhole plane is substantially coincident with a plane downstream of the projection system and optically conjugate to the object plane, as recited in claim 1.

By providing a lithographic apparatus with an interferometric measurement system it is possible, for example, to measure in situ the wave front aberration of the projection system. For example, by allowing the grating in the measurement system to move into and out of the projection beam it is possible to measure the wave front aberration of the projection system (when the grating is moved into the beam) and allow projecting the patterned beam onto target portions of the substrate (when the grating is moved out of the beam). This method of intermittent measuring wave front aberrations during operations of the lithographic projection apparatus is time saving as well as provides frequent measuring of wave front aberrations if needed (see pages 8 and 9 of the specification).

Moreover, contrary to a conventional PSPDI system where each individual beam (the test beam and/or the reference beam) impinging on the detector traverses two pinholes, the subject matter recited in claim 1 has one pinhole and this allows relaxing the limitation on the amount of light that reaches the detector which in turn leads to improved sensitivity (see page 8 of the specification).

Consequently, for at least the above reasons, Naulleau *et al.* does not disclose, teach or suggest the subject matter recited in claim 1.

Similarly, for at least the above reasons provided in claim 1, Naulleau *et al.* does not disclose, teach or suggest, *inter-alia*, “projecting a patterned beam of radiation onto a target portion of a substrate having a radiation sensitive material thereon,” as recited in claim 10. Furthermore, Naulleau *et al.* does not disclose, teach or suggest, *inter-alia*, “providing a grating, featuring a grating pattern in a grating plane, into the projection beam, such that the grating plane is substantially coincident with an object plane including patterning structure,” as recited in claim 10.

Consequently, for at least the above reasons, Naulleau *et al.* does not disclose, teach or suggest the subject matter recited in claim 10.

Therefore, Applicant respectfully submits that claims 1 and 10 and claims 2, 4, 5 and 7-9 which are dependent from claim 1, are patentable and respectfully request that the rejection of claims 1, 2, 4, 5 and 7-10 under § 102(e) be withdrawn.

Claim Rejection – 35 USC § 103

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Naulleau *et al.* (US Patent No. 6,233,056). Applicant respectfully traverses this rejection for at least the following reason.

Claim 3 is dependent from claim 1. Therefore, for at least the reasons provided above in claim 1, Applicant submits that Naulleau *et al.* does not disclose, teach or suggests the subject matter recited in claim 3.

Furthermore, the Office Action concedes that Naulleau *et al.* does not disclose the grating module being held by the mask table at a location for holding the mask but contends that it would have been obvious to one of ordinary skill in the art dispose the grating on the mask table at the location of the holding mask. Applicant respectfully disagrees.

In Naulleau *et al.*, the mask 34 merely serves to generate a spherical wave front via the pinhole 36 formed in mask 34 and the grating 38 is mounted on motor actuated stage 52 merely for alignments. Therefore, there is nothing in Naulleau *et al.* that suggests to use the mask 34 as a patterning device much less holding the grating module by the mask table. Moreover, Applicant submits that in order for Naulleau *et al.* beam 35 to be split (diffract) pinhole 36 and grating 38 must be spaced apart from each other.

Consequently, Naulleau *et al.* does not disclose, teach or suggest the subject matter recited in claim 3.

Therefore, Applicant respectfully submits that claim 3 is patentable and respectfully requests that the rejection of claim 3 under § 103(a) be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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